APPENDIX A

Data Summary Report

Final Fuel Spill-1 2002 Annual System Performance and Ecological Impact Monitoring Report

SAMPLE COLLECTION

Jacobs collected 131 groundwater samples from monitoring wells, 30 groundwater samples from extraction wells, and 47 surface water samples to obtain sufficient data to meet the objectives of the system performance and ecological impact objectives of the Fuel Spill-1 (FS-1) treatment system. Samples were collected between 26 November 2001 and 29 March 2002. Samples were submitted to Severn Trent Laboratories (SVTU) in University Park, Illinois for total metals analysis, and to Severn Trent Laboratories (SVTW) (the on-site laboratory) of Westfield, Massachusetts for ethylene dibromide (EDB) and volatile organic compound (VOC) analysis. Quality control (QC) samples were also collected and submitted for analysis at the frequency indicated in the Massachusetts Military Reservation (MMR) *Quality Program Plan* (QPP) (AFCEE 2000) and included field duplicate (FD) samples, equipment blank (EB) samples, trip blank (TB) samples (VOC analyses only), and samples collected for matrix spike/matrix spike duplicate (MS/MSD) analyses and/or laboratory replicate analyses.

DATA VALIDATION AND REVIEW

All data were reviewed for the following elements:

- Field precision
- Laboratory precision
- Field accuracy
- Sample holding times and preservation
- Instrument calibration
- Laboratory blanks
- Matrix spikes
- Laboratory control samples
- Surrogate compounds
- Serial dilutions.

Please note that in February 2002, the analyte list for VOCs reported by SVTW increased from 13 compounds to 38 compounds.

Field Precision

Field precision is measured by collecting and submitting FD samples to the laboratory for analysis. Thirteen FD samples were collected with the groundwater samples from monitoring wells, four FD samples were collected with the groundwater samples from extraction wells, and eight FD samples were collected with the surface water samples for EDB analysis. Two FD samples were collected with the groundwater samples from monitoring wells for VOC and total metals analysis. Relative percent difference (RPD) criteria were met for all FD sample pairs, indicating the use of good sampling techniques; qualifications were not required. FD results for all detected target analytes are presented in the following table.

Field Duplicate Precision Results for Detected Analytes

Location	Analyte	Date Sampled	Native Sample Result	Duplicate Sample Result	RL	Units	RPD
36EW4074	1,2-DIBROMOETHANE (EDB)	1/23/02	0.084	0.091	0.01	µg/L	8
36MW0002	BARIUM (TOTAL)	1/24/02	27.6 J	27.1 J	200	µg/L	1.8
36MW0002	CALCIUM (TOTAL)	1/24/02	3350 J	3400 J	5000	µg/L	1.5
36MW0002	IRON (TOTAL)	1/24/02	13300	13500	100	µg/L	1.5
36MW0002	LEAD (TOTAL)	1/24/02	33.9	34.8	3	µg/L	2.6
36MW0002	MAGNESIUM (TOTAL)	1/24/02	822 J	838 J	5000	µg/L	1.9
36MW0002	MANGANESE (TOTAL)	1/24/02	392	399	15	µg/L	1.8
36MW0002	POTASSIUM (TOTAL)	1/24/02	1100 J	1110 J	5000	µg/L	0.9
36MW0002	SODIUM (TOTAL)	1/24/02	5030	5160	5000	µg/L	2.6
36MW0002	ETHYLBENZENE	1/24/02	152	141	10	µg/L	7.5
36MW0002	M,P-XYLENE (SUM OF ISOMERS)	1/24/02	594	552	10	µg/L	7.3
36MW0002	O-XYLENE (1,2-DIMETHYLBENZENE)	1/24/02	149	149	10	µg/L	0
36MW0002	TOLUENE	1/24/02	141	137	10	µg/L	2.9
36MW0132B	1,2-DIBROMOETHANE (EDB)	1/16/02	5.42	4.76	0.4	µg/L	13
36MW0136	1,2-DIBROMOETHANE (EDB)	1/22/02	0.01	0.01	0.01	µg/L	0
36MW1010B	1,2-DIBROMOETHANE (EDB)	1/18/02	0.572	0.604	0.05	µg/L	5.4
36MW1039B	1,2-DIBROMOETHANE (EDB)	1/24/02	0.288	0.32	0.02	µg/L	10.5
36MW1041B	1,2-DIBROMOETHANE (EDB)	1/21/02	3.14	3.2	0.2	µg/L	1.9
36SW0003	1,2-DIBROMOETHANE (EDB)	12/28/01	0.0100 J	0.00900 J	0.01	µg/L	10.5
36SW0019	1,2-DIBROMOETHANE (EDB)	11/26/01	0.074	0.074	0.01	µg/L	0
36SW0019	1,2-DIBROMOETHANE (EDB)	12/28/01	0.011	0.012	0.01	µg/L	8.7
36EW4085	1,2-DIBROMOETHANE (EDB)	3/22/02	0.067	0.063	0.01	µg/L	6.2
36EW4090	1,2-DIBROMOETHANE (EDB)	3/26/02	0.551	0.421	0.05	µg/L	26.7

Field Duplicate Precision Results for Detected Analytes

Location	Analyte	Date Sampled	Native Sample Result	Duplicate Sample Result	RL	Units	RPD
36EW4140	1,2-DIBROMOETHANE (EDB)	3/26/02	1.09	1.13	0.1	µg/L	3.6
36MW0002	ALUMINUM (TOTAL)	3/22/02	40.6 J	ND	200	µg/L	NC
36MW0002	BARIUM (TOTAL)	3/22/02	25.7 J	24.4 J	200	µg/L	5.2
36MW0002	CALCIUM (TOTAL)	3/22/02	3180 J	3210 J	5000	µg/L	0.9
36MW0002	IRON (TOTAL)	3/22/02	12600	12700	100	µg/L	0.8
36MW0002	LEAD (TOTAL)	3/22/02	248	255	3	µg/L	2.8
36MW0002	MAGNESIUM (TOTAL)	3/22/02	839 J	841 J	5000	µg/L	0.2
36MW0002	MANGANESE (TOTAL)	3/22/02	385	385	15	µg/L	0
36MW0002	POTASSIUM (TOTAL)	3/22/02	1090 J	1070 J	5000	µg/L	1.9
36MW0002	SODIUM (TOTAL)	3/22/02	4750 J	4600 J	5000	µg/L	3.2
36MW0002	ETHYLBENZENE	3/22/02	134	133	5	µg/L	0.7
36MW0002	M,P-XYLENE (SUM OF ISOMERS)	3/22/02	393	456	10	µg/L	14.8
36MW0002	O-XYLENE (1,2-DIMETHYLBENZENE)	3/22/02	93.1	113	5	µg/L	19.3
36MW0002	TOLUENE	3/22/02	121	141	5	µg/L	15.3
36MW0132B	1,2-DIBROMOETHANE (EDB)	3/20/02	4.2	4.68	0.4	µg/L	10.8
36MW0503A	1,2-DIBROMOETHANE (EDB)	3/27/02	0.866	0.894	0.05	µg/L	3.2
36MW1001B	1,2-DIBROMOETHANE (EDB)	3/21/02	0.051	0.043	0.01	µg/L	17
36MW1010B	1,2-DIBROMOETHANE (EDB)	3/25/02	0.717	0.711	0.05	µg/L	0.8
36MW1038B	1,2-DIBROMOETHANE (EDB)	3/29/02	17.7	17.4	1	µg/L	1.7
36MW1041A	1,2-DIBROMOETHANE (EDB)	3/21/02	16.8	16.9	1	µg/L	0.6
36MW1041B	1,2-DIBROMOETHANE (EDB)	3/21/02	3.33	3.12	0.2	µg/L	6.5

Data Source: Jacobs, 26 September 2002, Site Environmental Evaluation (SEE) Database
J = estimated value ND = nondetect result RPD = relative percent difference
NC = not calculated RL = reporting limit µg/L = micrograms per liter

Laboratory Precision

Laboratory precision is measured by the analysis of MS/MSD samples, laboratory control sample/laboratory control sample duplicate (LCS/LCSD) samples, and/or laboratory replicate samples.

The RPD values for the MS/MSD analyses and laboratory replicate analyses were within the acceptance criteria; qualifications were not required. The nondetect results for selenium in five samples were qualified as estimated (coded UJ) due to noncompliant LCS/LCSD RPD values.

Field Accuracy

Field accuracy is assessed through the collection and analysis of EBs and TBs.

Nine EB samples were collected with the groundwater samples collected from monitoring wells. EB samples were not collected with extraction well samples or surface water samples because dedicated sample tubing and equipment are used to collect these types of samples. TB samples were submitted with VOC samples only. The result for aluminum in the sample collected at location 36MW0010A on 22 March 2002 was qualified as nondetect at the reported concentration due to contamination in the associated EB sample.

Sample Holding Times and Preservation

All samples collected as part of this sampling event met holding time and preservation requirements; qualifications were not required.

Instrument Calibration

Initial and continuing calibration criteria were acceptable for all EDB, VOC, and total metals analyses; qualifications were not required.

Laboratory Blanks

Aluminum, cobalt, copper, iron, nickel, potassium, vanadium, and zinc were detected in one or more laboratory blank. The reporting limits (RLs) used for these analytes are often much greater than the actual instrument detection limits (IDLs). The laboratory is required to report all results to the IDL. Thus, the blanks frequently contain low levels of analytes that fall between the IDL and RL. Associated sample data were evaluated against these blank levels. Positive results less than five times the blank levels were considered false positives and qualified as nondetect (coded U) at the reported value.

Results for arsenic, chromium, cobalt, copper, and silver were qualified as estimated (coded J or UJ) in several samples due to negative laboratory blank results. These positive and nondetect results are potentially biased low due to baseline instability.

Matrix Spikes

Six MS/MSD samples were collected with the groundwater samples from monitoring wells for EDB analyses; four MS/MSD samples were collected with the surface water samples for EDB analyses; and two MS/MSD samples were collected with the groundwater samples from extraction wells for EDB analyses. One MS/MSD sample was collected with the groundwater samples from monitoring wells for VOC and total metals analyses. All MS/MSD recoveries were within acceptance criteria; qualifications were not required.

Laboratory Control Samples

The nondetect result for carbon tetrachloride in the FD sample collected at location 36MW0002 on 22 March 2002 was qualified as rejected (coded R) due to extremely low LCS/LCSD percent recoveries.

Surrogate Compounds

All surrogate compound recoveries were within acceptance criteria; qualifications were not required.

Serial Dilutions

Samples undergoing metals analysis by method ILM04.0 are required to have a serial dilution performed on one sample for each matrix in each digestion batch. If the concentration of a given analyte is greater than 50 times its IDL and the percent difference (%D) between the original analysis and the diluted analysis is greater than 15 percent, the analyte result is qualified as estimated (coded J) indicating possible matrix interferences.

The results for barium in the five samples were qualified as estimated (coded J) due to serial dilution %D noncompliances.

Summary

In general, the data collected during this sampling event met the established data quality objectives and can be considered valid for decision-making purposes.

Surface water samples could not be collected at locations 36SW0019 and 36SW4188 in January, February, and March of 2002 because the bogs were flooded. Groundwater samples could not be collected at locations 36MW1039A and 36MW1039C in January and March of 2002 because these locations were damaged. A sample from extraction well location 36EW4137 could not be collected in March of 2002 because it was under water. A sample from extraction well location 36EW4150 could not be collected in March of 2002 because it was under water; a sample from location 36EW4149 was collected instead.

All samples submitted were successfully analyzed (100 percent completeness).

The completeness goal for valid measurements was met for all parameters. Selected data points were rejected (coded R) during the data review process due to QC nonconformance. One VOC data point was rejected (coded R), resulting in a greater than 99 percent completeness for this parameter. The rejected data point was due to low carbon tetrachloride LCS/LCSD recoveries.